Helijet Open Flow Helium Jet for Cryo-Crystallography

Data Sheet

Highlights

- < 15–75 Kelvin temperature
- < 2 litres/hour liquid helium consumption
- Uniform temperature distribution
- No crystal shielding necessary

The Agilent Technologies Helijet has been specifically designed for cryo-crystallography experiments where temperatures in the range 75–15 Kelvin are required. Developed for use with Agilent Technologies' complete range of Xcalibur, Gemini and SuperNova diffractometers, the Helijet features a compact construction which is ideal for use with a CCD diffractometer.

The unique design of the Helijet requires no crystal shielding allowing complete freedom of movement of a Kappa goniometer and unobscured optical access to the biological macromolecular or small molecule crystal.

The Helijet provides an efficient cold stream up to 5 mm from the tip of the nozzle with a very uniform temperature distribution within the cold stream. To prevent ice formation on the nozzle or the crystal sample the Helijet utilises a shield gas technology.

The Helijet's patented design reduces helium consumption to a minimum at < 2 litres per hour and provides a base temperature of < 10 K.

Figure 1. Side view of the Helijet cold head.

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Temperature Calibration

The Helijet is carefully calibrated using the second order temperature dependant phase transition of $TbVO_4$. This phase transition is observed as a splitting or doubling of diffraction reflections along the "c" axis resulting in the material changing from a tetragonal I cell to orthorhomic F. This is reported in the literature as occuring between 33 K and 20 K [1]. In the Helijet calibration a single crystal of $TbVO_4$ was mounted on an Xcalibur S diffractometer and cooled from 50 K to 10 K in 5 degree steps with diffraction images being measured along the "c" axis at each step. As expected, splitting of the reflections was observed between 30 K and 20 K as demonstrated in Figure 2.

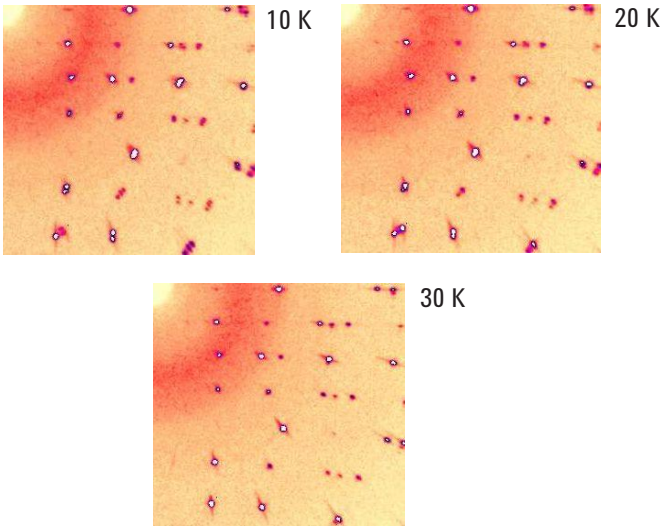
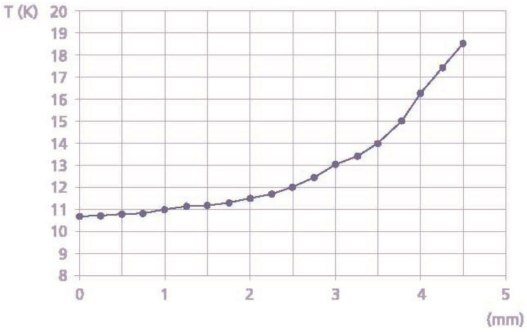
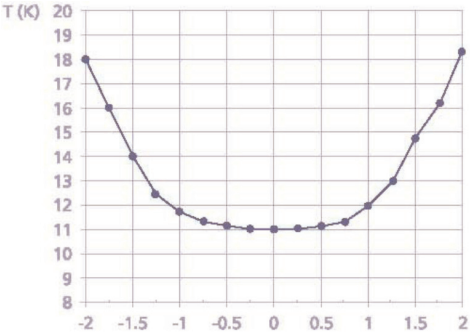


Figure 2. Series of diffraction images along the "c" axis depicting the phase transition of $TbVO_4$.



Typical temperature profile along the jet axis.



Typical temperature profile perpendicular to the jet axis.

References

1. G. Will, H. Gobel, C. F. Sampson, J. B. Forsyth, (1972). Phys. Lett. 38, 207-208

Technical Data

Base temperature	< 10 K
Liquid helium consumption	2 litres/hour at 15 K
Operating pressure	0.3 bar

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